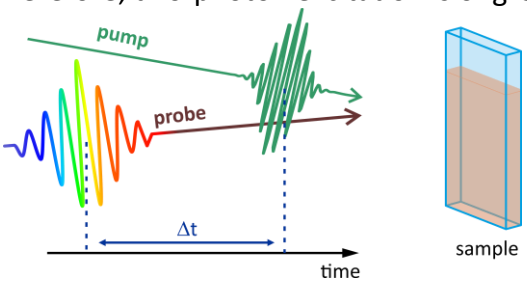
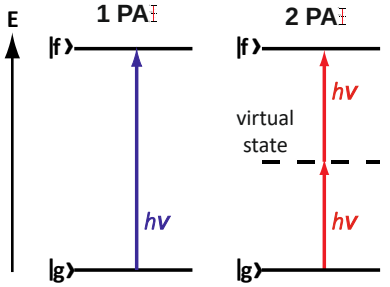
GOETHE UNIVERSITÄT FRANKFURT AM MAIN

MASTER THESIS

(POSSIBLE TO COMBINE WITH AN APPRENTICESHIP (PRAKTIKUM))

IMPLEMENTATION OF A TRANSIENT ABSORPTION SET-UP WITH TWO-PHOTON EXCITATION CAPABILITY

AK WACHTVEITL

Supervisor	***Dr. Chavdar Slavov*** AK Wachtveitl, Institute of Physical and Theoretical Chemistry chslavov@theochem.uni-frankfurt.de
Topic	The primary photophysical and photochemical reactions of light energy transformation in photoactive molecular systems and nanostructures occur on timescales from tens of femtoseconds to about a nanosecond. The most widely employed method for investigating the mechanism of these reactions is transient absorption spectroscopy. In this method, a sample is excited by an intense, ultrashort, narrowband laser pulse, while a weak broadband pulse probes the absorption changes of the sample as a function of time and wavelength. The electronic excitation of molecules via two-photon absorption allows the use of low energy photons (>700 nm). This is advantageous for applications, where longer light penetration depths and precise and small photoactivated volumes are required, e.g. in biological tissues or solid-state materials. Therefore, two-photon excitation is of great technological interest.  Concept of a pump-probe experiment  One- *vs.* two-photon absorption
Working project	The Master thesis work will be focused on the implementation of a new transient absorption set-up for two-photon excitation experiments. The pump pulses for the experiments will be provided by an already installed optical parametric amplifier (OPA). Within the project the following elements of the set-up will be installed – i) a white light continuum generation stage for probe pulses; ii) a sample compartment stage; iii) spectrometers for signal detection. The project will be concluded with demonstration of two-photon pump-probe experiments on a photoactive sample, e.g. a photocage, photoswitch or photoreceptor.
Previous knowledge	Basic knowledge of optics and spectroscopy. Technically oriented applicants are encouraged to apply.
Starting date	At the earliest convenience.
Applications	***Please send an email with a short motivation letter and CV.***